

Claims

- [c1] 1. A method for reading data from a high density optical recording medium; wherein the high density optical recording medium comprises:
- a substrate;
 - a first dielectric layer formed on the substrate;
 - a recording layer formed on the first dielectric layer;
 - a second dielectric layer formed on the recording layer;
 - a reflective layer formed on the second dielectric layer;
 - the method comprising
 - generating a value using a formula $Pr/(\lambda/NA)$, wherein Pr is a reading power, λ is a wavelength; and NA is a numerical aperture, wherein when the value is in a range of about 1.15 to about 8 mW/ μ m, a recording mark within the high density optical recording medium which is smaller than a resolution limit of an optical system is detected.
- [c2] 2. The method for reading data from a high density optical recording medium of claim 1, wherein the recording layer is a phase-change material.
- [c3] 3. The method for reading data from a high density optical recording medium of claim 2, wherein the phase-

change material comprises a metal.

- [c4] 4. The method for reading data from a high density optical recording medium of claim 3, wherein the recording layer is a combination of an element selected from a group consisting of Ge, Sb, Te, Ag, In, Sn, Se, Ga, Bi and V group element, and oxide or nitride thereof.
- [c5] 5. The method for reading data from a high density optical recording medium of claim 1, wherein the first dielectric layer and the second dielectric layer separately comprises SiNx, ZnS-SiO₂, AlNx, SiC, GeNx, TiNx, TaOx, YOx, GeCrN, AlNx, or a combination thereof.
- [c6] 6. The method for reading data from a high density optical recording medium of claim 1, wherein a material of the reflective layer is selected from a group consisting of Au, Ag, Al, Ti, Pb, Cr, Mo, W, Ta, Cu, Pd and an alloy thereof.
- [c7] 7. The method for reading data from a high density optical recording medium of claim 1, wherein the high density optical recording medium comprises an isolation layer between the second dielectric layer and the reflective layer.
- [c8] 8. The method for reading data from a high density optical recording medium of claim 7, wherein the isolation

layer is selected from a group consisting of SiC, SiO₂, TiO₂, Al₂Ox, GeCrN, GeNx and AlNx.

- [c9] 9. The method for reading data from a high density optical recording medium of claim 1, wherein the high density optical recording medium comprises an isolation layer between the first dielectric layer and the recording layer.
- [c10] 10. The method for reading data from a high density optical recording medium of claim 9, wherein the isolation layer is selected from a group consisting of SiC, SiO₂, TiO₂, Al₂Ox, GeCrN, GeNx and AlNx.
- [c11] 11. The method for reading data from a high density optical recording medium of claim 1, wherein the high density optical recording medium comprises a first crystallization-acceleration layer between the first dielectric layer and the recording layer.
- [c12] 12. The method for reading data from a high density optical recording medium of claim 11, wherein the first crystallization-acceleration layer is selected from a group consisting of SiC, GeCrN, GeNx and AlNx.
- [c13] 13. The method for reading data from a high density optical recording medium of claim 11, wherein the high density optical recording medium comprises a second

crystallization-acceleration layer between the recording layer and the reflective layer.

- [c14] 14. The method for reading data from a high density optical recording medium of claim 13, wherein the second crystallization-acceleration layer is selected from a group consisting of SiC, GeCrN, GeNx and AlNx.
- [c15] 15. The method for reading data from a high density optical recording medium of claim 1, wherein the high density optical recording medium comprises a polymer layer formed on the reflective layer.